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MEDICAL AND SANITARY DATA ON KOREA

1. The following is a summary of information from various sources available in the Office of the Chief Surgeon, United States Army Forces, Pacific, as of 31 September 1945.

2. Physical Geography. Korea is a moderately hilly country, suitable for rice culture except in the high and nearly impenetrable Diamond mountain range passing southward from the Manchurian boundary to Keijo, the capital city. Main ports of entry, Jinsen on the west, Fusan on the southeast, are connected by rail to the capital, Keijo. Further rail connections pass from the capital to Wonsen to the north and Mukden to the northwest. Road communication is limited. First class roads suitable for small buses connect the largest towns; they are narrow and winding. Second class roads are suitable for rickshas and wagons and would be passable for jeeps. Communities lie adjoining each other along lanes of communication whereas the land assigned for cultivation to a particular village may be several miles away, off the road. Climatic extremes vary from subfreezing to freezing temperatures for four winter months in the north to unbearable heat in July and August. In the southern section freezing weather lasts only for one or two months.

3. Economy. The country is poor, the population subsisting largely on dried fish and rice, both obtained through local industry. Silkworm culture is a wide-spread familial occupation of ancient origin, as are a number of skilled trades carried on by clans with guild-like secrecy, baking colored enamel on metal, silver and gold smithing, silk painting, and woodcarving. Dwellings are light, made up of panels of split bamboo covered with mud. Floors are of earth or rock. Heating is accomplished by means of an oven-like flue underneath the floor leading from the cooling fire banked with wood and charcoal at one side of the house to a chimney on the opposite side. All fuel is obtained from the forested mountains except for small quantities of coal available only to the rich. Floors are covered with matting, likely to be heavily infested. Spring cleaning, a national event like "clean-up week", does little but throw the insects out into the road and nothing to prevent their crawling back again.

a. Few persons own foreign cars although the richest have shortlived Japanese vehicles. Travel is by means of ricksha and bus. Wealthy peasants own an ox and cart. Any kind of vehicular travel is dangerous in the mountainous area near the Manchurian border due to ravines, precipices, and poor bridges.

b. Foreign enterprises are chiefly Standard Oil (distribution), Singer Sewing Machine, cloth buyers, and Christian Missions.



c. All civil administrators, all police, all directing heads of high schools, as well as many of the peasant farmers, who are subsidized, are Japanese.

4. EDUCATION. Schools contain about 25% of all desiring to go to school, from kindergarten through high school. Wealth makes considerable difference in ability to compete in the examination for entrance. A university for men and another for women was operated by Christian societies in Keijo before the war.

a. Medical Schools. According to the most recent reports there were 6 recognized medical schools in Korea, and the establishment of 2 additional medical schools was planned. The most important is the medical faculty of the Keijo Imperial University in Keijo, the only one of university rank. Four are designated as Igaku Semmon Gakko, (Medical Professional Schools), three in Keijo (Kyongsong) and one in P'yongyang. An additional school of poor standing is said to be operating in Keijo. The planned medical schools, according to Japanese newspaper reports of 1944 were to be established in Kwangju and Hamhung.

b. Dental Schools.

One is reported at Keijo.

c. Veterinary Schools.

One is reported at Suwon.

d. Pharmacy.

A school of pharmacy is reported at Keijo.

5. Public Health. Public health administration comes under the control of the Police Bureau, sanitation section. Technical details of waterworks construction and administration are said to be under the control of the Section of Public Works, Bureau of Home Affairs.

a. Water Supply. Larger cities and towns have waterworks, to a total of 85 in the last official report, but municipal water supplies only 20% to 63% of the population even in these localities. The majority of the population depend upon surface water, often heavily contaminated due to the use of nightsoil in fields, and obtained from shallow wells, ponds, rivers, or deep wells inadequately cased or capped. The amount is generally adequate, but shortages occasionally occur in the big towns.

b. Sewage and Waste Disposal.

(1) Sewerage systems in 18 cities are listed in the 1940-1941 Japan Municipal Yearbook. No information is given as to treatment systems and it is presumed that untreated sewage is discharged into rivers. In the poorer sections of cities, and some towns, open gutters carry sewage, but the more general disposition is by honey wagons which



collect the nightsoil from poorly protected bucket or box privies. In villages it is stored in leaky cisterns and hauled away to the fields in open dripping carts.

(2) Waste and garbage disposal is required in cities and towns designated by local governors. Households are required to place collected rubbish in special receptacles. The town or city must transport the trash to a fixed place and dispose of it by burning, burial, or other methods deemed not injurious to health.

c. Quarantine. Large quarantine stations have been established at Pusan, Inch'on and Wonsan, with secondary stations at Chinnamp'o, Kunsan, Mokp'o, Najin, Sinuiju, Songjin, Unggi, and Yongamp'o. Bathing and disinfecting plants are available, together with laboratories, hospital and office facilities. The entire program has been Japanese directed and Japanese enforced, with little participation by the Koreans allowed.

d. Hospitals and Medical Institutions.

(1) Hospital facilities in Korea are scarce, but on the basis of the last official reports it is estimated that there are 150 to 160 hospitals, with a capacity of approximately 13,800 beds, of which 6,900 are leper colony beds, and 400 are beds reserved for military and naval personnel. This gives approximately 2.7 beds per 10,000 people available for civilian medical requirements, contrasting with an average of 34 per 10,000 in Japan and 100 per 10,000 in the United States. In 1938, the last year for which detailed official reports are available, 149 hospitals were listed. Of this total, 4 were large Government institutions under the direct control of the Government General, 50 were public establishments, maintained by provinces or municipalities, 20 were Christian mission hospitals, maintained by foreigners, and 75 were private institutions. In addition to the hospitals there are numerous private dispensaries, essentially physicians' offices, with primitive accommodations for a few in-patients.

(2) Laboratories. The main bacteriologic and hygienic laboratory is the Central Laboratory of the Government General in Keijo, also known as the Serum Manufacturing Institute, which produces vaccines and other biologicals. In addition, each province is reported to be equipped with a bacteriologic laboratory, and with a hygienic laboratory capable of performing chemical examinations. A Research Institute for Infectious Diseases is reported from Inch'on, and a Government Veterinary Institute with research laboratories is located near Pusan, supplying veterinary vaccines and serums, and smallpox calf lymph.

e. Medical Personnel. According to estimates based on semi-official figures there were approximately 3000 physicians in Korea in 1942, equally divided between Koreans and Japanese. At least 500 of the Korean physicians received their medical education either in American or Canadian missionary hospitals or in the Severance Union Medical School in Keijo, or in the United States, Canada, or Europe. They were well distributed over the country and may be of great service in the rehabilitation



and operation of mission hospitals in conjunction with an American occupying force. The ratio of qualified physicians to the total population was 1.3 per 10,000 in 1939. The ratio of dentists to population in 1938 was 0.37 per 10,000 population. There were 546 pharmacists, 1,836 nurses (2/3 Koreans) and 1,859 midwives in Korea as of 1939. (Hospital nurses are required to pass a police supervised written and practical test before receiving a license to practice.) In addition to the qualified medical personnel in 1939 there were 3,684 registered native-style healers (isheng). These men practice traditional Chinese medicine which relies primarily on magic, but some of whose practices, such as the use of excrement as a drug, and freshly killed frogs as poultices, are directly opposed to the teachings of the scientific school.

## 6. Animals.

### a. Vectors of disease.

(1) Mosquitoes. The most important anophelene mosquitoes identified in Korea or known in Manchuria and suspected to be present in Korea are: A. hyrcanus sinensis, breeding in stagnant clear water in open country, A. maculipennis atroparvus, brackish and fresh water, A. pattoni, rain pools, mill streams, A. lindesayi japonicus, clear pools, rocky mountain streams, and A. koreicus, found in muddy shady pools. Of these hyrcanus is the most important malaria vector, maculipennis and pattoni are important vectors in nearby Manchuria, and koreicus not proven as a vector but suspect. A. hyrcanus sinensis is also a carrier for Wuchereria bancrofti causing filariasis. Aedes mosquitoes identified from Korea include A. albopictus, a potential carrier of dengue fever, A. albopictus, A. koreicus, and A. togoi, known carriers of W. bancrofti, (A. togoi has also been identified as a carrier of the virus of Japanese B. encephalitis), and A. chemulpoensis, A. seoulensis and A. dorsalis which have not been identified as disease carriers, but together with other Aedes mosquitoes are suspected as possible carriers of Japanese B. encephalitis. Of the Culex mosquitoes found C. pipiens pallens, and C. tritaeniorhynchus have been identified as carriers of Japanese B. encephalitis, and, with C. sinensis, and C. quinquefasciatus (fatigans), are suitable vectors for W. bancrofti.

(2) Flies. Musca domestica the common housefly, is exceedingly common, and undoubtedly contributes to the high incidence of enteric disease in its capacity as a mechanical carrier. Sandflies have not been reported from Korea, but the presence of indigenous kala-azar indicates that some species is present. Phlebotomus chinensis is reported from Northern China.

(3) Fleas. Xenopsylla cheopis, the tropical rat flea is the most important species due to its role in the transmission of plague, X. astia, and Pulex irritans, the flea of human beings, are also found, and can transmit plague.

(4) Lice. Both the body louse and the head louse are found widely. They transmit typhus, trench fever, and louse-borne relapsing fever.



(5) Mites. Trombidium (Trombicula) akamushi, the vector of Rickettsia orientalis, cause of scrub typhus (tsutsugamushi disease) is found in Korea, but the disease has not been definitely identified. Sarcoptes scabiei, the itch mite, is prevalent.

(6) Mollusks. Several species of water snails present in Korea are important as intermediate hosts of parasitic flukes infecting man. Katayama (Oncomelania) nosophora is the local carrier for Schistosoma japonicum, which differs from the other parasitic flukes in requiring no intermediate crustacean host.

(7) Rodents. Rats of various species are very prevalent, the most important in the spread of disease being Rattus rattus rattus, the black house rat, R. norvegicus, the brown sewer rat, and R. alexandrinus, the roof rat. Importance as disease carriers is based upon their acting as hosts to fleas transmitting plague and murine typhus, and mites carrying scrub typhus, or from the organisms carried in their excreta contaminating food or water with Salmonella organisms or Leptospira. Their bite may cause rat-bite fever.

b. Dangerous Animals.

(1) Reptiles. Two species of pit viper are found: Agkistrodon blomhoffii, and A. intermedius. Both grow to a length of 2 feet, but most specimens are smaller. These snakes have triangular heads and dark brown bodies. They are found in damp dark places, and are rarely seen during the day. A. blomhoffii is distinguished by a row of black spots on each side of the back. The toxin of these snakes is usually not very potent, although deaths from bites have been reported.

(2) Tiger, lynx, leopard, and wolf are found in the high mountain areas.

7. Plants. Although there are numerous plants capable of causing allergic symptoms, and some herbs and roots occasionally eaten by the natives in time of famine with resultant poisoning, it is felt that these will cause little trouble to military personnel. Ginseng, Panax shinseng, is used by the native healers, and exported to China as a medicine. The root tastes like licorice but appears to have little medicinal use save as a demulcent. Numerous edible mushrooms are found, and it is known that some poisonous ones are present, but specific data as to their recognition are not available. Rhus vernicifera, the lacquer tree, has a poisonous sap which causes a dermatitis like that from poison ivy in susceptible individuals who handle the wood, or lacquer decorated utensils.

8. Diseases of Military Importance.

a. Dysentery. Both amoebic and bacillary types are common, the former comprising more than half of cases classified by type. Amoebic abscess is said to be a frequent complication. Bacillary dysentery has a preponderance of the more virulent Shiga strain, but Flexner, Strong and Sonne strains are also found.



b. Typhoid and Paratyphoid Fever. Among the natives there is a high incidence of typhoid fever, as well as paratyphoid A, B, and C. In addition there are numerous cases of diarrhea and enteritis in which no specific organism is found, thought to be due to organisms of the Salmonella group.

c. Malaria. Cases occur throughout Korea, but are most common in the southern section. Infection is generally with Plasmodium vivax, but a few cases are due to P. Malariae. Indigenous infection with P. falciparum is rare except among drug addicts using poor sterile technique and a common needle for injections.

d. Venereal Disease. Syphilis is present in 10% to 40% of the population, according to various estimates; gonorrhea is very common. Chancroid is frequent; lymphogranuloma venereum occurs but is not common; granuloma inguinale is rare.

e. Fevers of Typhus Group. (1) Epidemic, louse borne typhus is most common in the northeastern and west central provinces. In view of the general infestation of the Koreans any occurrence that causes movement of population groups or over-crowding is likely to set off an epidemic.

(2) Endemic, murine, flea borne typhus occurs sporadically, throughout Korea; the disease is reported less frequently than the louse borne variety.

(3) Scrub, or mite borne typhus (tsutsugamushi disease) has not been proved to be present in Korea, but its mite vector is found and experience during the war has shown that this disease is more widely spread than was previously thought, and since it is present on the Japanese islands it is very likely present in Korea as well.

(4) Epidemic hemorrhagic fever (Sengo fever) was first encountered by the Japanese in Manchuria, and later in North China as well. It may have been introduced into Korea. The disease is believed to be rickettsial, and resembles Rocky Mountain Spotted Fever in its clinical picture, with abrupt onset, purpuric eruption, intense prostration and delirium or coma. The mortality rate is said to be over 50%. The vector has not been identified, but it is suspected to be a Dermacentor tick.

f. Skin diseases are common, particularly fungus infections, impetigo, and scabies.

g. Trench foot and frostbite. In the northern part of Korea with winter temperatures going down to zero precautions against frostbite are necessary. Cases occur with a temperature below 20 degrees. Trench foot, brought on by exposure to cold and wetness in conjunction with muscular inertia at temperatures around the freezing point is characterized by early loss of sensation, followed by pain, blistering, deep necrosis, and moist gangrene unless early treatment is obtained.



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9. Diseases of possible military importance.

a. Cholera is endemic, but has been kept under control since 1919-1920, except for minor outbreaks, by a strict quarantine.

b. Relapsing fever was formerly very common but has been rare in recent years. Primarily louse borne, it might become prevalent with crowding together of refugees or prisoners of war. The picture is usually one of recurrent febrile attacks with increasing weakness, and a low mortality, but there is a more serious type with jaundice and a case fatality rate of 50%.

c. Plague has not been reported from Korea, but rats and fleas are common, and epidemics of plague are common in Manchuria and North China, from which it might be introduced.

d. Japanese B. encephalitis occurs sporadically.

e. Dengue has not occurred epidemically in recent times, but the vector, Aedes albopictus, is present and there are disease foci in China, Formosa and The Ryukyu Islands.

f. Sandfly, or papnataci fever, has not been reported from Korea, but is common in North China. The diagnosis may have been missed as the disease resembles influenza so closely in its clinical picture.

10. Diseases of minor military importance.

a. Leptospirosis. In contrast to the three forms found in Japan all infections described in Korea have been due to Leptospira icterohaemorrhagica. It is contracted by eating or drinking contaminated food or water or by swimming or wading in water contaminated by rat urine. The period of highest incidence is from July to November, it is rare in the winter. Patients develop fever, usually associated with jaundice and hepatic enlargement, sometimes splenomegaly.

b. Rat-bite fever or "sodoku" is common among the poorer classes, caused by the bite of a diseased rat. There is an incubation period of two weeks, then febrile attacks, with a bluish red eruption over the whole body and secondary inflammation at the site of the lesion. Severe neuralgic pains are typical of the disease, which has an identical clinical picture whether caused by Borrelia muris (Spirochota morsus muris, Spirillum minus) or Streptobacillus moniliformis.

c. Rabies is common among the many stray dogs.

d. Cerebrospinal meningitis is endemic, 50 to 500 cases occur annually.

e. Helminth Infections, other than filariasis.

(1) Nematodes (round worms). More than 95% of the population suffer from Ascariasis. Native grown fruits and vegetables are almost



certain to be contaminated with the ova of this parasite. Hookworm disease is present in 25% to 30% of the population; both Ancylostoma duodenale and Necator americanus are found.

(2) Cestodes. (Flat worms). The native diet makes little use of meat, so that beef and pork tape-worms, although present, do not claim many human victims. Since fish is a staple food, and infection with the broad fish tapeworm Diphyllobothrium latum is common in fresh water fish of Korea, many people are infected by eating fish either raw or insufficiently cooked. Human sparganosis is occasionally encountered, acquired by drinking unpurified water contaminated with infected Cyclops, the copepod intermediate cestode host. Typical spargana develop in the human musculature with regional swelling, edema, and intense pain. Inflammation about the eyes is frequent.

(3) Trematodes. (Flukes). The widespread custom of eating certain fish, crustaceans and water plants raw or undercooked, and the use of untreated water for drinking or bathing results in numerous trematode infections.

A. Lung fluke. Paragonimus westermani is the most common fluke infection. It is acquired by eating insufficiently cooked fresh water crab or crayfish, the intermediate host of the parasite. Swallowed larvae pass from the intestine to the lungs where maturation takes place, with the formation of pseudo-tubercle and abscesses. The eggs are coughed out, starting the cycle again. The symptoms are fever, chronic cough, and haemoptysis, and simulates tuberculosis. Patients become emaciated and the disease is fatal if untreated. In 1923 it was estimated that 30,000 of the Korean population were infected.

B. Intestinal flukes. Heterophyes heterophyes and Metagonimus yokogawai are fairly common, acquired by eating insufficiently cooked fresh or salt fish, from brackish water or fresh water. Mullet is a common infected species. The symptoms are diarrhea, or more severe local symptoms, during the invasion of the intestinal wall. Fasciolopsis buski is contracted from eating the raw bulbs of aquatic plants.

C. Clonorchis sinensis, the liver fluke, is a less common invader than the lung and intestinal flukes. It is also acquired from fresh water fish, and attacks the bile passages of man, causing enlargement of the liver, edema and diarrhea.

D. Schistosomiasis, due to S. Japonicum, is infrequent in Korea. Infection is acquired by drinking polluted water or wading or bathing in it. The parasites penetrate the intestinal wall, finally reaching the liver where they copulate and produce eggs which find their way back through the intestinal wall with local damage.

## 11. Recommendations.

a. Water supply. All untreated water should be considered unsafe for drinking, even if obtained from municipal systems.



b. Sewage. Careful waste disposal is essential in view of the prevalence of enteric diseases.

c. Mosquito control. Malaria is widespread, and other mosquito borne diseases are present such as dengue, filariasis, and Japanese B encephalitis. The general mosquito control program should be implemented by individual precautions against bites.

d. Fly control. Buildings should be sprayed with DDT for residual effect, messhalls, kitchens and latrines screened if possible. Garbage disposal should be faultless.

e. Typhus control. Adequate facilities for maintenance of personal cleanliness, laundering of clothes, and delousing powder for dusting on clothing should be available. Anti-louse precautions will help, also, in preventing transmission of relapsing fever, and will be effective against fleas. The possibility of scrub typhus should be borne in mind, when camp-sites are being cleared. Grass and shrubs should be burned, and clothing precautions, including impregnation of clothing, should be practiced if there is any indication that mites are present.

f. Sandfly control. Sandflies are able to penetrate ordinary mosquito netting. If they are present special netting will be required. Breeding places are in cracks in walls, and in the ground around buildings, or in ground litter. As they are weak fliers placing barracks on high ground with ventilation will help in avoiding exposure. Residual DDT spraying of the interior walls of buildings is indicated, with special attention to cracks. The outside walls should be sprayed in a one foot swathe around each window and door.

g. Rodent control is important against plague, leptospirosis, and murine typhus.

h. An intensive Venereal Disease Control Program is essential.

i. Bathing and washing should not be allowed except in safe water, because of the danger of schistosomiasis, leptospirosis, and sparganosis. Slippers or shoes should be worn when going to or from showers to guard against hookworm infection.

j. Troops should be instructed as to the danger attendant upon eating native food. Any fresh produce bought for Army messes should be thoroughly disinfected with antiseptic wash, and thoroughly cooked. If natives are employed about the mess they should be checked for intestinal parasites capable of direct transmission.

k. Trench foot and frostbite. During the wet-cold season foot gear should be loose, allowing heavy socks to be worn without interference with the circulation. Feet must be kept dry.



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1. Injuries caused by heat. During the two month period of extreme heat precautions must be taken against heat stroke and heat exhaustion.

*Paul J. Robinson*  
Col. MC

*for and in the absence of*

GUY B. DENIT  
Brigadier General, U. S. Army  
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